IN THE CLAIMS:

- 1. (Original) An isolated nucleic acid comprising a nucleotide sequence encoding a mutated human synuclein protein or homologue thereof.
- 2. (Original) The isolated nucleic acid of claim 1 wherein said mutated synuclein protein is selected from the group consisting of alpha, beta and gamma synuclein proteins.
- 3. (Original) The isolated nucleic acid of claim 2 wherein said mutated synuclein protein is the alpha synuclein protein.
- 4. (Original) The isolated nucleic acid of claim 3 wherein said nucleotide sequence contains at least one mutation at base pair position 209.
- 5. (Presently amended) The An isolated nucleic acid comprising a nucleotide sequence encoding a mutated human alpha synuclein protein of claim 4 wherein said having a mutation at position 209 is a change from wherein a guanine to is replaced by an adenine.
- 6. (Presently amended) The An isolated nucleic acid of claim 5 having comprising the sequence given in SEQ ID NO. 1.
 - 7-9. (Cancelled)
- 10. (Currently amended) A vector comprising the isolated nucleic acid of claim 15.
 - 11. (Original) A host cell comprising the vector of claim 10.
 - 12-23. (Cancelled).
- 24. (Currently amended) A method of detecting subjects at increased risk for Parkinson's Disease, comprising:

obtaining a sample comprising nucleic acids, proteins or tissues from the subjects; and

detecting in the nucleic acids, proteins or tissues the presence of a mutation an adenine at base pair position 209 in the alpha synuclein gene which is associated with Parkinson's disease,

thereby identifying subjects at increased risk for the disease.

- 25. (Withdrawn) The method of claim 24 wherein said mutation is located on human chromosome four.
- 26. (Withdrawn) The method of claim 25 wherein said mutation is located in the alpha synuclein gene.
- 27. (Withdrawn) The method of claim 26 wherein said mutation causes an amino acid substitution at position 53.
- 28. (Withdrawn) The method of claim 27 wherein said mutation causes an alanine to threonine substitution at position 53.
- 29. (Withdrawn) The method of claim 24 wherein said detecting step comprises combining a nucleotide probe which selectively hybridizes to a nucleic acid containing said mutation, and detecting the presence of hybridization.
- 30. (Withdrawn) The method of claim 29 wherein said nucleotide probe is an oligonucleotide complementary to a portion of the synuclein gene, wherein said portion comprises a mutation associated with predisposition to Parkinson's Disease.

31-32. (Cancelled)

- 33. (Withdrawn) The method of claim 24 wherein said detecting step comprises amplifying a nucleic acid product comprising said mutation, and detecting the presence of said mutation in the amplified product.
- 34. (Withdrawn) The method of claim 33 wherein said detecting step comprises selectively amplifying a nucleic acid product comprising said mutation, and detecting the presence of amplification.
- 35. (Withdrawn) The method of claim 34 wherein said amplifying step comprises at least one annealing step whereby at least one oligonucleotide is annealed to said sample of nucleic acids.

- 36. (Withdrawn) The method of claim 35 wherein said amplifying step uses two oligonucleotides.
- 37. (Withdrawn) The method of claim 36 wherein said two oligonucleotides have the sequences of SEQ ID NOs 2 and 3.
- 38. (Withdrawn) The method of claim 24 wherein said detecting step comprises detecting the presence or absence of a restriction endonuclease site as detected by enzymatic digest of said sample of nucleic acids.
- 39. (Withdrawn) The method of claim 38 wherein said restriction endonuclease site is recognized by *Tsp*451.
- 40. (Withdrawn) The method of claim 24 wherein said detecting step comprises chain termination with a labeled dideoxynucleotide.

41-43. (Cancelled)

- 44. (Withdrawn) The method of claim 24 wherein said detection step comprises identification of said mutations with an antibody.
- 45. (Withdrawn) The method of claim 44 wherein said antibody is directed against an isolated human synuclein protein or peptide containing at least one mutation.
- 46. (Withdrawn) The method of claim 45 wherein said isolated human synuclein protein or peptide is selected from a group consisting of the human alpha, beta, and gamma synuclein proteins or fragments thereof.
- 47. (Withdrawn) The method of claim 46 wherein said isolated human synuclein protein or peptide has the mutated sequence given in SEQ ID NO 5.
- 48. (Withdrawn) The method of claim 47 wherein said mutation is at amino acid position 53.
- 49. (Withdrawn) The method of claim 48 wherein said mutation is an alanine to threonine substition

50-56. (Cancelled)

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57. (Currently amended) An isolated nucleic acid comprising a mutation in an alpha human synuclein gene wherein a guanine is replaced by an alanine at base pair position 209or homologue thereof.

58-60. (Cancelled)

- 61. (Currently amended) The isolated nucleic acid of claim 6057 having the sequence given in SEQ ID NO 1.
 - 62-74. (Cancelled)
- 75. (New) A method of detecting subjects at increased risk for Parkinson's Disease, comprising:

obtaining a sample comprising nucleic acids from the subjects; and detecting in the nucleic acids the presence of the nucleic acid of claim 5, thereby identifying subjects at increased risk for Parkinson's Disease.

76. (New) A method of detecting subjects at increased risk for Parkinson's Disease, comprising:

obtaining a sample comprising nucleic acids from the subjects; and detecting in the nucleic acids the presence of the nucleic acid of claim 6, thereby identifying subjects at increased risk for Parkinson's Disease.